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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/262,597	03/04/1999	HOWARD M. KINGSTON	119994-5	9647

7590 06/14/2011

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EXAMINER	
HYUN, PAUL SANG HWA	

ART UNIT	PAPER NUMBER
1772	

MAIL DATE	DELIVERY MODE
06/14/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/262,597	KINGSTON, HOWARD M.	
	Examiner	Art Unit	
	PAUL HYUN	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment filed by Applicant on April 14, 2011 has been acknowledged. Claims 1-19 remain pending. Applicant amended claim 13 to correct a typographical error. Applicant also amended the Abstract to comply with the length requirement of Abstracts.

The claim objection and the objection to the Abstract cited in the previous Office action have been withdrawn in light of the amendment.

Despite Applicant's argument regarding the patentability of the claims, the rejections are maintained.

Priority

Applicant's argument that prior-filed applications 08/458,757, 08/357,097 and 08/127,263 provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for all the claims of this application has been fully considered but it is not persuasive. Applicant argues that the priority applications "inherently disclose, in their repeated references to creation of a gas phase and retention of a sample other than the gas phase, the intrinsic analysis of the phases thus produced". Applicant further argues that "the whole point of creating the phases is to determine their constituency". This argument is not persuasive because phase analysis is not the sole purpose of conducting microwave-assisted digestions. It is well known in the art that microwave-assisted digestions, which involve the creation of liquid and gas phases inside a vessel, are used to conduct decomposition reactions, synthesis

reactions, and extraction, all of which do not require analysis of the liquid and gas phases. Therefore, absent specific disclosure in the priority applications directed to analysis of an unvolatilized portion of a volatilized sample to determine the composition of said unvolatilized portion, priority to applications 08/458,757, 08/357,097 and 08/127,263 will not be granted. Furthermore, Applicant's argument does not address how the priority applications provide support for limitations recited in many of the dependent claims, namely the steps of:

1) adding sample to a closed vessel while the contents of the vessel are heated (claims 14, 15, 17 and 18); and

2) analyzing a silicon sample (claims 2, 3, 7-10 and 17-19).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **1-6, 8-10, 13, 16 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuoka et al. (US 5,849,597) in view of Saville (US 4,613,738).

Tokuoka et al. disclose a method of determining the purity of silicon sample (see Abstract and Fig. 1). The method comprises the steps of providing a closed vessel comprising a unitary chamber having a plurality of open compartments, one compartment 16 for accommodating a silicon sample, another compartment for accommodating a sample solution 18 of hydrofluoric acid and nitric acid (see lines 18-37, col. 2), and heating the contents of the vessel such that the solution 18 vaporizes and enters compartment 16. When the acid solution enters compartment 16, the

solution reacts with silicon and produces silicon tetrafluoride, which vaporizes and enters the compartment holding the acid solution 18. When the cap 2 of the vessel is opened, the gas phase escapes and what remains behind in compartment 16 are the impurities, which can be analyzed (i.e. identity and concentration, see claim 12) to determine the purity of the silicon sample.

The method disclosed by Tokuoka et al. differs from the claimed method in that Tokuoka et al. do not disclose the use of microwave energy to heat the contents of the vessel. Instead, the reference discloses the use of a heating medium or an iron plate (see lines 7-12, col. 11).

Saville discloses a heat facilitated digestion vessel for conducting reactions (e.g. elemental trace analysis, see lines 22-27, col.1) wherein the vessel is designed to be heated by microwave energy (see Abstract). Consequently, the vessel is made from a microwave transparent material such as a fluoropolymer (see lines 55-65, col. 4), and comprises a vent tube 54 for releasing the gas phase. Saville discloses that the use of microwaves requires less time to heat a sample than traditional heating methods that utilize hot plates (see lines 15, 20, col. 1). In light of the disclosure of Saville, it would have been obvious to one of ordinary skill in the art to use microwave energy to heat the contents of the vessel disclosed by Tokuoka et al. Naturally, it would have been obvious to one of ordinary skill in the art to design the vessel disclosed by Tokuoka et al. as specified by Saville such that it is suitable for microwave heating.

Claim **7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuoka et al. in view of Saville as applied to claims 1-6, 8-10, 13, 16 and 19 above, and further in view of Dumler et al. (US 5,436,164).

While Tokuoka et al. disclose the use of monocrystalline silicon wafers as a sample, neither Tokuoka et al. nor Saville disclose the use of polycrystalline silicon as a sample.

Dumler et al. disclose the importance of determining the purity of polycrystalline silicon (see lines 15-25, col. 1). The reference discloses that the manufacture of semiconductors require high quality monocrystalline silicon and that monocrystalline silicon are made from polycrystalline silicon. In light of the disclosure of Dumler et al., it would have been obvious to one of ordinary skill in the art to apply the modified Tokuoka et al. method to determine the purity of polycrystalline silicon.

Claims **11 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuoka et al. in view of Saville as applied to claims 1-6, 8-10, 13, 16 and 19 above, and further in view of Wallace (US 4,118,282).

Neither Tokuoka et al. nor Saville disclose the operating frequency of the microwave source.

Wallace discloses a distillation unit that uses microwave energy to heat a sample (see Abstract). The reference discloses that although microwave frequency ranges from 300 MHz to 300 GHz, commercially available microwave generators operate at 915 or 2450 MHz (see lines 5-14, col. 3). In light of the disclosure of Wallace, it would have

been obvious to one of ordinary skill in the art to conduct the modified Tokuoka et al. method using a microwave generator that operates at 915 or 2450 MHz.

Claims **14, 15, 17 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuoka et al. in view of Saville as applied to claims 1-6, 8-10, 13, 16 and 19 above, and further in view of Sperling et al. (US 5,314,664) and Celler et al. (US 4,240,843).

Neither Tokuoka et al. nor Saville disclose the step of introducing additional sample (i.e. liquid silicon) during the digestion process.

Sperling et al. disclose a method of determining the concentration of trace elements in a sample by using continuous microwave digestion (see line 60, col. 2-line 20, col. 3). The method comprises the steps of providing a flow-through reactor having an inlet and an outlet wherein the inlet is connected to a sample source and the outlet is connected to an analyzer for analyzing the digested sample. This set up enables continuous sampling and analysis. Celler et al. disclose the use of liquid silicon to make semiconductor substrates (see lines 1-5, col. 3). In light of the disclosure of Sperling et al., it would have been obvious to one of ordinary skill in the art to provide a sample inlet for introducing a liquid sample into the modified Tokuoka et al. apparatus for continuously processing and analyzing the liquid sample, and in light of the disclosure of Celler et al., it would have been obvious to one of ordinary skill in the art to use liquid silicon as the sample.

Response to Arguments

Applicant's argument with respect to the claims has been fully considered but it is not persuasive.

Applicant argues that the claims are patentable because neither Tokuoka et al. nor Saville disclose a method wherein a sample is heated at the same time a gas phase is cooled. This argument is not persuasive because the digestion vessel disclosed by Saville does allow the gas phase to be cooled at the same time the liquid phase is heated. As indicated in the rejection above, the digestion vessel disclosed by Saville comprises a vent tube 54 for releasing pressure inside the vessel as the contents of the vessel are heated by microwaves. It is well-known in the art that a direct correlation exists between pressure and temperature of a gas (PV=nRT). Thus, when pressure inside the digestion vessel disclosed by Saville is released via vent tube 54, the temperature of the gas phase inside the vessel must naturally decrease, even as the liquid phase is being heated by the microwaves. The Examiner maintains the position that the pressure release conducted by vent tube 54 disclosed by Saville anticipates the limitation “cooling said gas phase while continuing to heat said sample by said microwave energy”. For the foregoing reason, Applicant’s argument that the claims are patentable because neither Tokuoka et al. nor Saville disclose a method wherein a sample is heated at the same time a gas phase is cooled is not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL HYUN whose telephone number is (571)272-8559. The examiner can normally be reached on Monday-Friday 10AM-6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, In Suk Bullock can be reached on (571)-272-5954. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Paul S Hyun/
Examiner, Art Unit 1772

/In Suk Bullock/
Supervisory Patent Examiner, Art Unit 1772